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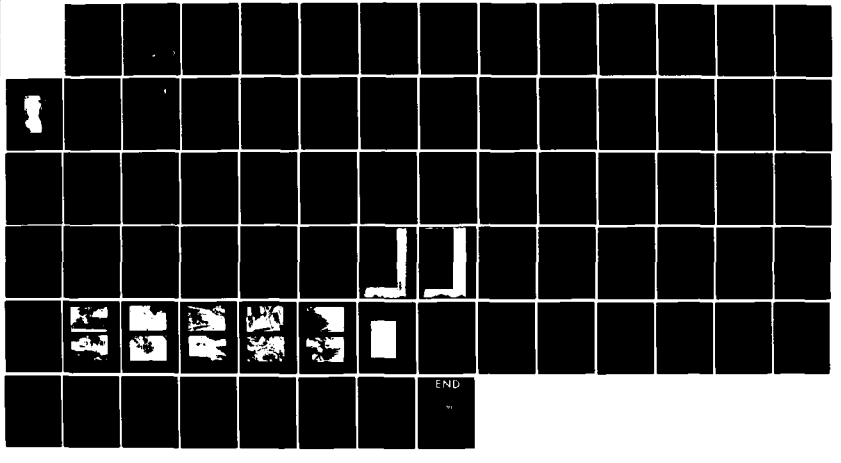

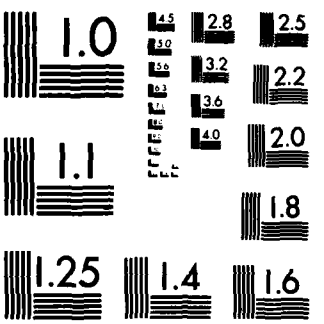

(2)

CONNECTICUT RIVER BASIN
ASHFIELD, MASSACHUSETTS

ASHFIELD POND DAM
MA 00523

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
WALTHAM, MASS 02154

AUGUST 1978

ASHFIELD POND DAM

MA 00523

CONNECTICUT RIVER BASIN
ASHFIELD, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Ashfield, Massachusetts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is an earthfill embankment about 775 ft. long with a maximum height of about 15 ft. The inspection of the dam does not indicated conditions which would constitute an immediate hazard to human life or property. The dam is small in size having a high hazard potential.

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PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Inventory No.:	MA 00523
Name of Dam:	ASHFIELD POND DAM
Town Located:	ASHFIELD
County Located:	FRANKLIN
State Located:	COMMONWEALTH OF MASSACHUSETTS
Date of Inspection:	3 AUGUST 1978

BRIEF ASSESSMENT

Ashfield Pond Dam is an earth embankment about 775 feet long with a maximum height of about 15 feet. A 30 foot long, 14.5 foot high stone masonry and concrete stepped spillway is located about 110 feet from the east abutment. A rectangular concrete low level outlet, 4 feet wide and 1.7 feet high is located at the east end of the spillway. Water flows from the conduit and spillway into one of two downstream channels, depending upon the magnitude of flow. Both channels converge about 1000 feet downstream to form South River which flows into Deerfield River, a tributary of the Connecticut River.

Phase I inspection and evaluation of Ashfield Pond Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the earth embankment and the outlet works, the project is considered to be in fair condition. The project has a number of deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for a drainage area of 0.99 square miles, it was necessary to synthesize a test flood hydrograph for the contributing area. Because the dam is classified as small in size, with a high hazard potential, the test flood, in accordance with Corps of Engineers guidelines, falls between one half the Probable Maximum Flood and the Probable Maximum Flood (PMF). Selection of 1/2 PMF as the test flood, yields an outflow of 1698 cfs (assuming the low level outlet is closed), which is greater than the maximum spillway discharge capacity of 965 cfs and would result in an overtopping of the dam by about 0.43 feet. Since the dam will be overtopped by the test flood, it is considered

that the spillway is inadequate from a hydraulic and hydrologic viewpoint. However, overtopping of the dam with a short duration, small head, would probably not breach the heavily vegetated slope of the dam. Nevertheless, a number of alternatives are recommended, for implementation by the owner within 12 months of receipt of this Phase I Inspection Report, for providing adequate spillway capacity.

In addition, remedial measures are recommended, for implementation by the owner within 12 months of receipt of this Phase I Inspection Report, to improve overall conditions. These measures, in general, are as follows:

- Programs for observing and monitoring seepage
- Repairs to embankments and appurtenant structures
- Programs for operation, maintenance and inspection

Eugene O'Brien P.E.
New York No. 29823

This Phase I Inspection Report on **Ashfield Pond Dam has been** reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

DEC 22 1978

Honorable Michael S. Dukakis
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor Dukakis:

I am forwarding to you a copy of the Ashfield Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Town of Ashfield, Board of Selectmen, Ashfield, Massachusetts 01330.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

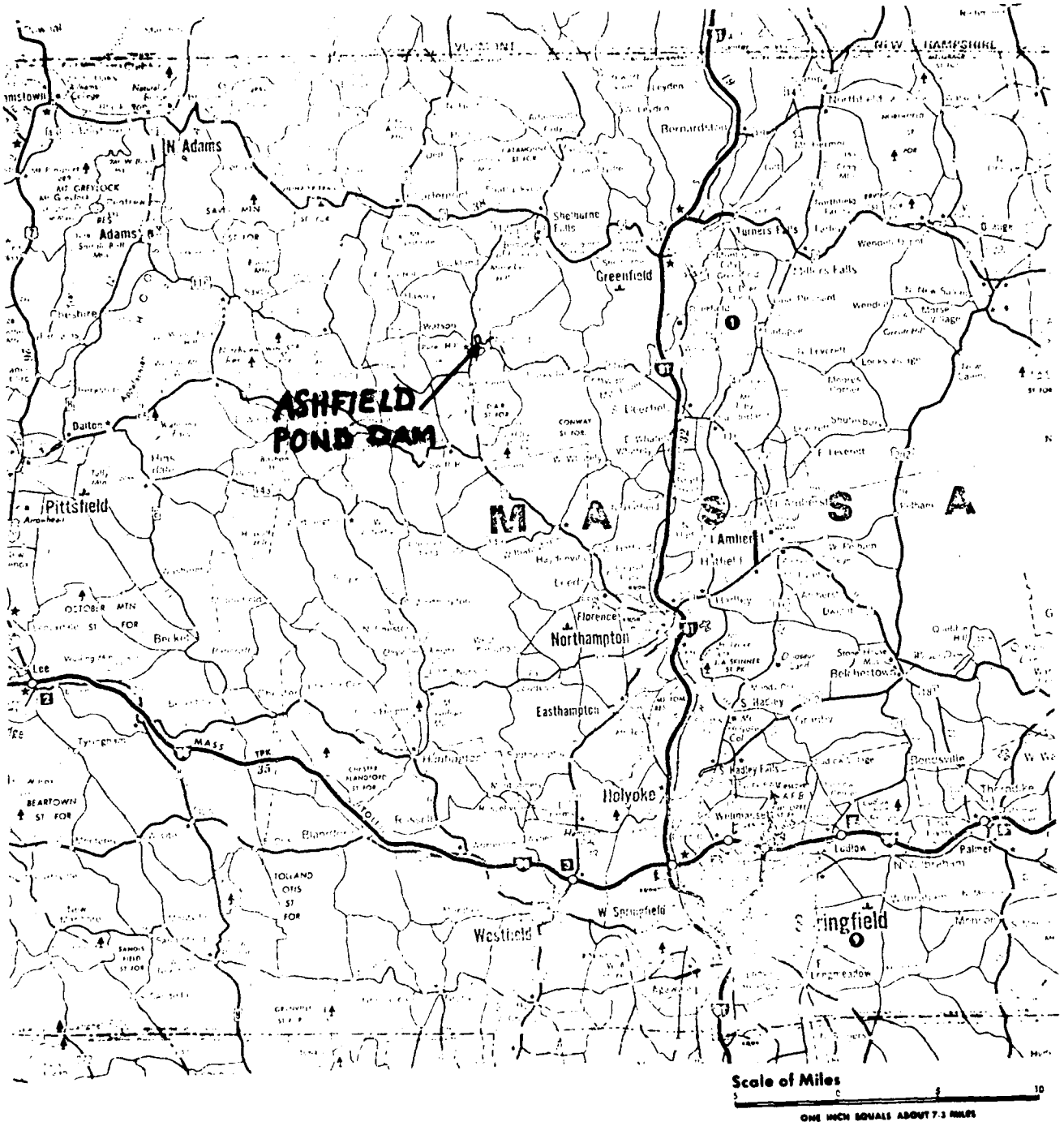
It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

CONNECTICUT RIVER BASIN
ASHFIELD POND DAM
INVENTORY NO. MA 00523
PHASE I INSPECTION REPORT

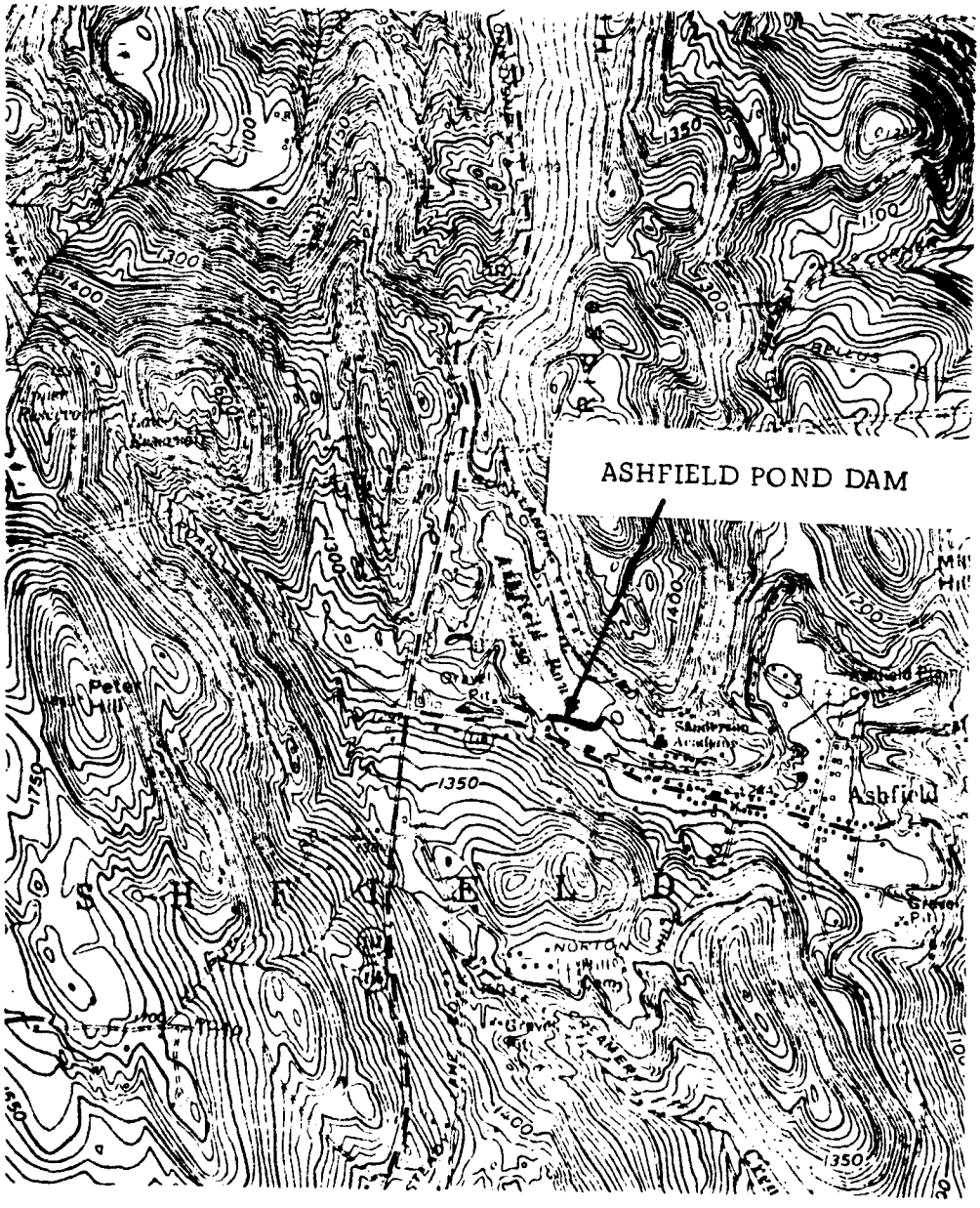
CONTENTS

1. GENERAL OVERVIEW OF DAM - UPSTREAM AND DOWNSTREAM SLOPES



VICINITY MAP
ASHFIELD POND DAM

ASHFIELD QUADRANGLE
MASSACHUSETTS
SCALE: 1" = 2000 FT.



TOPOGRAPHIC MAP
ASHFIELD POND DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CONNECTICUT RIVER BASIN
INVENTORY NO. MA 00523
ASHFIELD POND DAM
TOWN OF ASHFIELD
FRANKLIN COUNTY, COMMONWEALTH OF MASSACHUSETTS

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tippetts-Abbett-McCarthy-Stratton has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Tippetts-Abbett-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0298 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenances

Ashfield Pond Dam is an earth dam approximately 775 feet long with a maximum height of about 15 feet and a crest width varying from 9 to 13 feet. The horizontal alignment of the crest (El 1254.5), which trends east to west, is multi-curved. The upstream slope of the embankment varies

from 1(V): 2(H) to 1(V): 3(H) with generally 1(V): 2.5(H) the average. The downstream slope varies from 1(V): 1.1(H) to 1(V): 3(H) with generally 1(V): 2(H) the average. The upstream slope is protected with riprap to within 6 to 9 feet of the crest.

A 30 feet long, 14.5 feet high stone masonry and concrete spillway structure is located about 110 feet from the east abutment. As shown on an available drawing the spillway is founded on wood planks. The downstream face of the spillway is stepped. The steps are of stone masonry, 3, 3.5 and 4 feet high, each set back 2 feet. The sill consists of concrete. The spillway crest (El 1250) is 8 feet wide; 3 feet horizontal and 5 feet at a slope of 1(V): 5(H). The crest is notched for the provision of flash boards. The upstream face of the spillway is sloped at an unknown angle.

Flanking the spillway are 2-foot wide stone masonry training walls, 35 feet long, with a maximum height above the spillway crest of 4.5 feet. The lower three feet of the downstream walls are concrete. The west wall is straight; the east wall is "dog-legged" five feet from the bottom step, resulting in a decrease of the width between the training walls to 21 feet. The upstream end of the training walls is located about 16 feet from the downstream edge of the spillway sill. The downstream channel floor has been concreted within the limits of the training walls and on top of the wooden plank foundation. There is a steel and wood pedestrian bridge over the spillway.

A low level outlet consisting of a 4-foot wide, 1.7-foot high rectangular concrete conduit is located at the east end of the spillway, outfalling at the base of the lowest step (El 1239.5±). Discharges are through a 38-foot long stone masonry conduit and are controlled by a manually operated steel rack and pinion mechanism attached to a 53-inch wide, 40-inch high sluice gate. The estimated discharge capacity of the conduit is 147 cfs. The latter is inside a concrete capped, stone masonry gate shaft, 3 feet by 4.5 feet, located on the spillway sill about 3 feet from the east training wall. The inlet to the low level conduit is reported to be at the base of the spillway structure, about 26 feet from the upstream wall of the gate shaft.

Discharges from the spillway and the low level outlet are carried by two channels. The primary channel which conducts the low flow, follows the natural creek and is 10 feet wide, 3 feet deep. At about 500 feet downstream it continues in a 48-inch diameter steel pipe and flows from there, underground for about another 500 feet. The secondary channel which carries the high flows, is lined with stone masonry. The latter is about 1000 feet long, 10 feet wide and 6 feet high. Both channels converge in the vicinity of Buckland Road Bridge to form South River which flows into Deerfield River, a tributary of the Connecticut River.

b. Location

The dam is located northwest of the Town of Ashfield, about 0.5 mile northeast of the intersection of Massachusetts Highway Routes 116 and 112.

c. Ownership

Ashfield Pond Dam is owned by the Town of Ashfield. The day-to-day maintenance is managed by the Board of Selectman, Town of Ashfield. There is no day-to-day operation of the dam.

d. Purpose of Dam

The impoundment provided by the dam is for recreational purposes. The Town maintains a public beach on the east abutment.

e. Design and Construction History

Original design and construction records are not available. It is reported that an original smaller dam was built about 1750 to provide power for a grist mill and later failed. The present dam was built before 1800.

f. Normal Operating Procedures

There are no operating procedures. It is reported that the level of the lake is not controlled and that the low level outlet has not been operated since about 10 years ago when repairs were made to the spillway.

g. Size Classification

The dam is less than 40 feet high and has a maximum storage capacity of less than 1000 acre-feet. It is, therefore, classified as a "small" dam.

h. Hazard Classification

The dam is in a "high" hazard potential category because there are, immediately downstream from the dam, about 20-25 single and mulitple family residential homes, several business establishments, municipal buildings and churches. In the event of a failure, the resulting flood wave would cause substantial loss of life and property.

For details on the selection of the hazard potential category see Section 5.6.

i. Operator

There is no day-to-day operation of the dam and no one has been designated as the operator of the dam. In case of an emergency, the Board of Selectmen, Town of Ashfield, is to be notified. (Phone number: 413-628-4439 or through local police phone: 413-628-4445).

1.3 PERTINENT DATA

a. Drainage Area

The total drainage area contributing to the Ashfield Pond is 634 acres and consists of steep hills with narrow valleys. About 80 percent of the drainage area is covered by well-established hardwood forest, and there has been very little development by man. The surface area of the lake, at spillway crest (37 acres), is about 6% of the total drainage area.

b. Discharges at Damsite

Discharges at the damsite are over a uncontrolled stone masonry spillway and through a low level outlet.

The spillway is 30 feet long, 4.5 feet high with an 8 feet wide sill at about El 1250. The computed maximum discharge, at a head of 4.5 feet is 965 cfs.

The low level outlet consists of a 5.0 feet wide, 38.0 feet long stone masonry conduit with the invert at the downstream end estimated at El 1239.5. The invert elevation at the upstream end of the conduit is unknown. The computed maximum discharge from the conduit, with a head equivalent to the top of dam (El 1254.5) is 147 cfs.

The maximum combined outflow from spillway and low level outlet is 1,112 cfs.

There is no record of the maximum flood at the damsite but reportedly the dam has never been overtopped during a major flood.

c. Elevation (feet above MSL)

Top of dam	1254.5
Maximum pool-design surcharge	Unknown
Maximum pool-test flood	1254.7
Full flood control pool	Not Applicable
Recreation pool	1250
Spillway crest (gated)	Not Applicable
Upstream portal invert diversion tunnel	Not Applicable

Downstream portal invert diversion tunnel	Not Applicable
Streambed at centerline of dam	1239.5±
Maximum tailwater	Unknown

d. Reservoir (feet)

Length of maximum pool	2700±
Length of recreation pool	2700±
Length of flood control pool	Not Applicable

e. Storage (acre-feet)

Recreation pool	306 (est.)
Flood control pool	Not Applicable
Design surcharge	184 (est.)
Test flood surcharge	193.3
Top of dam	490

f. Reservoir Surface (acres)

Top of dam	43.9±
Test flood pool	43.9
Flood-control pool	Not Applicable
Recreation pool	37±
Spillway crest	37±

g. Dam

Type	Earth
Length, feet	775
Height, feet	15
Top width	Varies from 9 feet to 13 feet
Side Slopes - Upstream	Varies from 1(V): 2(H) to 1(V): 3(H) with 1(V):2.5(H) average
- Downstream	Varies from 1(V):1.1(H) to 1(V):3(H) with 1(V): 2(H) average.
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown
Other	None

h. Diversion and Regulating Tunnel

Type	Not Applicable
Length	Not Applicable
Closure	Not Applicable
Access	Not Applicable
Regulating facilities	Not Applicable

i. Spillway

Type	Broad-crested
Length of weir, feet	30
Crest elevation, feet	1250
Gates	None
Upstream channel	None
Downstream channel	See description in Section 1.2 and Section 3.1
General	None

j. Regulating Outlets

The regulating outlets consist of an uncontrolled spillway and a stone masonry conduit.

The spillway is 30 feet long, 4.5 feet high with a flat crest width of 3.0 feet at El 1250.

The low level outlet conduit is about 4 feet wide, 1.7 feet high, 38 feet long with the invert at the outlet estimated at El 1239.5. Discharges into downstream channel are controlled by a manually operated rack and pinion sluice gate, in an open 3 feet by 4.5 feet concrete capped stone masonry gate shaft. The sluice gate is presently not operable.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

There are no design data, construction drawings or specific memoranda available for the dam. There is a drawing, made in 1936, showing some details of the low level outlet structure, gate and gate shaft and is included in the Appendix. Sketch of the dam, plan and section, given in the Appendix were prepared on the basis of approximate field measurements made at the time of this visual inspection.

Information on subsurface conditions could not be located.

2.2 CONSTRUCTION RECORDS

There are no construction records available.

2.3 OPERATING RECORDS

No operation records are available and there is no daily record of pool elevation or rainfall at the dam site.

2.4 EVALUATION OF DATA

a. Availability

Existing information was made available by the Board of Selectmen, Town of Ashfield.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity

In general, the information obtained from the above mentioned drawing and the personal interviews is consistent with observations made during the inspection and therefore considered reliable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Ashfield Pond Dam was made on 3 August 1978. The weather was cloudy, temperature about 75°F. The last rainfall occurred the previous night. At the time of inspection, the pond level was about 12 inches below spillway crest.

b. Embankment

The earth embankment appears to be in fair condition. The horizontal and vertical alignments of the crest are good with only minor rutting and erosion caused by pedestrian traffic. The crest is covered with vegetation, shrubs, ground cover, saplings and large trees (See Photograph No. 5)

The downstream slope shows some minor sloughing in the area where steep slopes occur and there is some minor erosion in the form of gullys caused by trespassing and runoff. At several locations on the slope and on the crest there are some fairly large animal burrows. The slope is covered with heavy vegetation, mainly shrubs, ground cover, saplings and very large trees (See Photograph Nos. 2 - 4). The roots of these trees are at the surface of the slope. There is evidence that some trees have been cut in the past. In the vicinity of the downstream toe, about 10 feet west of the spillway structure, there is a damp zone which may be due to runoff from the rainfall of the previous evening. A channel located about 170 feet west of the spillway which carries runoff from Mass. Highway 116 approaches the embankment, and flows along the downstream toe of the embankment to the spillway channel. At several locations, the channel has cut away the toe approximately 1 to 2 feet. (See Photograph No. 9).

The upstream slope does not exhibit any sloughing or signs of trespassing, but there are a few areas where the riprap protection is displaced. The ground vegetation is growing up through much of the riprap protection. The slope is covered with heavy vegetation including large trees.

c. Appurtenant Structures

The stone masonry spillway appears to be in good condition with only few stones missing. Mortar pointing is missing over large areas and there is some vegetation growing from the joints. The concrete on the spillway sill is in generally good condition, however, the crest has been sedimented with beach sand and there is some vegetation growing. There are no flashboards in use, and it is reported they have never been used. The stone masonry, the concrete base of the training walls and the spillway

channel floor are in good condition. The wood deck of the pedestrian bridge is in fair condition with only a few boards broken and/or missing. The steel support beams are in good condition, however, they are rusty. (See Photograph No. 6).

There is minor seepage at several locations along the base of the spillway. There is slight leakage (about 3 to 5 gpm) at the contact with the first step of the spillway and the east training wall. Very minor seepage was observed exiting from behind the downstream end of the east training wall. Examination of the vicinity around the spillway indicates that the foundation is probably glacial till. No bedrock outcropping was observed in the vicinity of the dam.

Though the gate is closed, water is discharging from the low level outlet; probably flowing over and through the gate seals. The stone masonry and mortar pointing of the gate shaft walls are in good condition but there is minor seepage through the pointing of the upstream wall. The bottom of the gate shaft is completely filled with silt and debris covering the gate. The gate is inoperable because of the filled condition of the shaft. It is reported that the gate has not been operated in 10 years. The open end of the gate shaft is protected with a grid consisting of 0.5 inch steel reinforcing and is secured to the operating stand mechanism by means of wires. All metal is extremely rusty. (See Photograph Nos. 7 & 8).

d. Abutments

There are no signs of seepage or other unusual conditions at the abutments.

e. Downstream Channel

There are two downstream channels; the primary channel operates for normal flows and the secondary channel for above normal flows. The primary channel is in generally good condition, with only some debris in the channel and some overhanging vegetation. At the time of inspection, flows did not appear to be impeded. The secondary channel is completely overgrown with swamp-grass. (See Photograph Nos. 10 - 12). No flow was observed in this channel. The walls of the channel appear to have been lined with stone masonry which has fallen into the channel, except adjacent to the Buckland Road Bridge. Both channels converge under the bridge and flows are unimpeded in the South River.

f. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual condition which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the investigations revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in Section 7.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no operational procedures for the project.

4.2 MAINTENANCE OF DAM

There is no formal maintenance manual for the project. Maintenance of the embankment and appurtenant structures are minimal to non-existent. There is no scheduled program of inspection by Town personnel, however, there is a statewide program of inspection established several years ago by the Department of Environmental Quality Engineering Division of Waterways. A copy of their last report dated October 25, 1976 is included in the Appendix.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities.

4.4 WARNING SYSTEMS IN EFFECT

There is no warning system in effect.

4.5 EVALUATION

The maintenance and operating procedures for the dam and appurtenant structures are considered totally inadequate. Measures to improve these deficiencies are given in Section 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE BASIN CHARACTERISTICS

The total drainage area contributing to the Ashfield Pond is 634 acres and consists of steep hills with narrow valleys. About 80 percent of the drainage area is covered by well-established hardwood forest, and there has been very little development by man.

5.2 SPILLWAY CAPACITY

The uncontrolled spillway is 30 feet long with a flat concrete sill (El 1250), 3.0 feet wide, 4.5 feet below the top of the training walls, and a stepped downstream face about 10.5 feet high. It is estimated that the capacity of the spillway, at a maximum head of 4.5 feet, corresponding to the top of the dam (El 1254.5) is about 965 cfs. In addition, the 4.0 feet wide, 1.7 feet high, 38 feet long low level outlet has a maximum calculated capacity with the same head of 147 cfs. Maximum outflow capacity is 1,112 cfs.

5.3 RESERVOIR CAPACITY

The maximum capacity, including surcharge storage, is given in the National Inventory of Dams as 490 acre-feet. It is estimated that the surcharge storage, between the spillway crest (El 1250) and the top of the dam is 184 acre-feet, which is equivalent to a depth of 3.5 inches of run-off over the entire basin.

5.4 FLOODS OF RECORD

There are no records of flow from this small drainage area and no records of the maximum water elevation on the pond. Rainfall records indicate a total of 9.92 inches during the period September 20-22, 1938 with 4.34 inches falling on September 19 at Greenfield Mass.[1/]

5.5 DESIGN FLOOD

Because there are no data on Probable Maximum Floods for an area of 0.99 square miles, it was necessary to synthesize a test flood hydrograph for the contributing area. Initially, a depth-duration relation for maximum probable point rainfall (10 square miles area), for durations, from 6 hours to 24 hours, was taken from Weather Bureau Sources.[2/] The distribu-

1/ Hurricane Floods of September 1938, U.S.Geological Survey Water Supply Paper No. 867, 1940.

2/ Seasonal Variation of the Probable Maximum Precipitation East of the 105 Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24 and 48 Hours, Hydrometeorological Report No. 33, 1956.

tion of the rainfall was based on data in a publication of the World Meteorological Organization.[3] Increments of depth from the depth-duration relation, at 15 minute intervals, were arranged in the probable storm sequence shown in the Appendix.

The drainage area was then sub-divided into three sub-basins; (1) the Pond, 37 acres, with no lag and no incremental losses, (2) the unchannelled area, 129 acres, with a 15 minute, lag and 0.2 inches per hour infiltration loss, and (3) the channelized area, 468 acres, with a 15 minute lag and a loss of 0.2 inches per hour.

A test flood, equal to one half the Probable Maximum Flood (1/2 PMF) was derived by summing one half the Probable Maximum Flood hydrographs from each sub-basin as shown in the Appendix, resulting in a 1/2 PMF inflow-peak of about 2,640 cfs.

5.6 OVERTOPPING POTENTIAL

The adequacy of the Ashfield Pond Dam spillway was tested by routing one half the Probable Maximum Flood through the reservoir, and its surcharge storage of 3.5 inches, using a computerized technique. The water surface was assumed to be at the spillway crest at the start of the flood inflow. With the low level outlet open, the routed flood with a peak outflow of 1476 cfs raised the lake to El 1254.71 or 0.21 feet above the crest of the dam. With the low level outlet closed, it is expected that a peak outflow of 1,698 cfs would raise the lake to El 1254.93 or 0.43 feet above the crest.

In order to estimate the downstream dam failure hydrograph, the U.S. Corps of Engineers "Rule of Thumb" guidance was used. The estimate assumes: (a) the reservoir surface is at the top of the dam at the time of the breach, (b) a breach of 40% of the dam length occurs (300 feet) and (c) the channel has an average roughness coefficient (n) of 0.07. It is estimated that at a selected section, 750 feet downstream of the dam, the peak flood wave discharge is 26,500 cfs with a wave height of about 13 feet. The visual inspection corroborates the information shown on the USGS Quadrangle sheet for Ashfield, Mass., which indicates, at this section, about 20 - 25 houses at or about El 1240. These houses would probably be destroyed or damaged by the estimated flood wave.

5.7 EVALUATION

Since the dam is expected to be overtopped with an inflow equal to 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic

3/ Manual for Estimation of Probable Maximum Precipitation, World Meteorological Organization, Operational Hydrology Report No. 1973.

and hydrologic standpoint. It should be pointed out however, that the dam supposedly has not been overtopped in almost 200 years and has been adequate against the major floods in the region in 1936, 1938 and 1955. The flood used to test the adequacy of the spillway assumes that a 6-hour rainfall, equivalent to twice the 100-year, 6-hour rainfall, will be centered over a 0.99 square mile area.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any serious structural problems with the embankment, spillway, low level outlet structure or pedestrian bridge. The deficiencies, which are described in Section 3, require attention; recommended measures to improve the deficient conditions are given in Section 7.

b. Design and Construction Data

No design computations or other data regarding the structural stability of the dam have been located.

On the basis of the performance experience, the visual inspection, as well as engineering judgment, the dam appears to be adequate.

c. Operating Records

There are no operating records kept or available. There are no records or reports of any operational problems which would affect the stability of the dam. However, the silting and debris laden low level gate shaft which renders the gate inoperable, could lead to problems.

d. Post-construction Changes

It is reported that the present dam was built sometime before 1800. There are no records of any construction changes which have taken place since that time. It is reported, however, that the spillway, the training walls, the spillway floor, the gate shaft and the low level outlet conduit were repaired about 10 years ago.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

Phase I investigation of Ashfield Pond Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the earth embankment and outlet works, the project appears to be in fair condition. The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods (PMF) for an area of 0.99 square miles, it was necessary to synthesize a test flood hydrograph for the contributing area. The drainage area was divided into three sub-basins and a test storm, equal to one half the Probable Flood (1/2 PMF), was derived by summing one half the Probable Maximum Flood hydrographs from each sub-basin. The 1/2 PMF inflow-peak was about 2,640 cfs.

The adequacy of the spillway was tested by routing the flood through the reservoir using a computerized routing technique. The water surface was assumed to be at the spillway crest at the start of the storm. The peak outflow from the routed test flood (1/2 PMF), with the low level outlet open, was 1,476 cfs at a head of 4.71 feet (El 1254.71 or about 0.21 feet above the crest), with the low level outlet closed, the peak outflow was 1,698 cfs at a head of 4.93 feet (El 1254.93 or about 0.43 feet above the crest).

Since the dam is expected to be overtopped with an inflow equal to 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic and hydrologic standpoint. It should be pointed out, however, that the dam supposedly has not been overtopped in almost 200 years and has been adequate against the major floods in the region in 1936, 1938 and 1955. The flood used to test the adequacy of the spillway assumes that a 6-hour rainfall, equivalent to twice the 100-year, 6-hour rainfall, will be centered over a 0.99 square mile area.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

The recommendations and remedial measures described in subsequent paragraphs should be undertaken by the owner within the next 12 months after receipt of this Phase I Inspection Report.

d. Necessity for Additional Investigations

Additional investigations to assess the adequacy of the dam and appurtenant structures do not appear necessary.

7.2 RECOMMENDATIONS

It is recommended, that within 12 months of receipt of this Phase I Inspection Report, the owner take the necessary steps to have either the existing spillway widened, construct an additional spillway at a different location, or provide additional storage by maintaining a lower lake level.

7.3 REMEDIAL MEASURES

a. Alternatives

The inadequacy of the spillway described above indicates an overtopping of the dam of about 0.2 to 0.4 feet. This is not considered critical since the assumptions used in calculating the test flood are conservative. In addition, overtopping the dam with a short duration, small head would probably not breach the heavily vegetated slope of the dam. Nevertheless, to prevent possible overtopping, consideration should be given to widening the existing spillway, constructing an additional spillway at a different location, or providing additional storage by maintaining a lower lake level.

b. Operation & Maintenance Procedures

It is recommended that the following measures be undertaken by the owner within the next 12 months:

1. A monitoring program should be established to determine whether the zone of dampness described in Section 3 is actually caused by seepage. If seepage is the case, a systematic program of observation and monitoring of changes in the pattern and quantity of the seepage should be initiated. Such observations can be accomplished by the installation of piezometers.

2. A formal program of maintenance and operation should be established and periodic inspections on a biannual frequency should be made.

3. Missing stones should be replaced on the downstream face of spillway.

4. Crest of spillway should be cleaned and vegetation removed.

5. Low level outlet gate mechanism should be made operable, greased and painted. The gate shaft should be cleaned and provisions made for preventing a reoccurrence of the silting of the shaft. Consideration should be given to construction of a gate house.

6. The missing and broken wood decking for the pedestrian bridge should be replaced and the steel beams should be painted.

7. The highway drainage channel located along the downstream toe of the embankment should be rerouted. Areas along the toe which have been eroded should be refilled with suitable material.

8. Riprap, where displaced, should be rebuilt on suitable bedding material. All vegetation growing through the riprap should be eliminated.

9. Crest rutting, gullys and animal burrows should be refilled to grade with suitable material. Where sloughing has occurred, the slope should be flattened. Measures should be taken to prevent the reoccurrence of these conditions.

10. Debris and overhanging trees should be removed and hauled away from the spillway downstream channels. The stone masonry lining in the secondary channel should be rebuilt.

11. Heavy brush, shrubs and young saplings should be removed from the embankment, spillway channel and the area immediately downstream of the embankment toe. Large conifers, but not deciduous hardwoods, should be removed and the remaining trees should be inventoried and their condition monitored. If a tree dies, the area around the tree should be closely monitored for seepage.

12. Round the clock surveillance should be provided by the owner during periods of unusually heavy precipitation.

13. The owner should develop a formal warning system with local officials for alerting downstream residents in case of emergency.

VISUAL INSPECTION CHECKLIST

APPENDIX A

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT ASHFIELD POND DAM DATE 8-3-78

TIME 10.00 AM

WEATHER SUNNY

W.S. ELEV. 1249.0 * U.S.

PARTY:

1. Harvey S. Feldman
2. Jyotindra H. Patel
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	All project features inspected by party members		
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

* Lake level taken from USGS topographic Sheet which indicates EL. 1250. It is assumed that this elevation is also of Spillway Sill. At time of inspection, the water level was 1 foot below the spillway sill.

PERIODIC INSPECTION CHECK LIST

PROJECT ASHFIELD POND DAM DATE 8-3-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

DAM EMBANKMENT

Crest Elevation 1254.5 FT. (based on USGS Sheet)

Current Pool Elevation 1249.0 FT. (based on USGS sheet)

Maximum Impoundment to Date _____

Surface Cracks None observed

Pavement Condition No pavement on crest.

Movement or Settlement of Crest None observed

Lateral Movement None observed

Vertical Alignment Generally good except minor rutting at Crest caused by pedestrian traffic.

Horizontal Alignment Generally Good

Condition at Abutment and at Concrete Structures Generally good at both abutment.

Indications of Movement of Structural Items on Slopes None observed

Trespassing on Slopes None on upstream slope; Downstream slope shows some evidence of trespassing

Sloughing or Erosion of Slopes or Abutments Minor sloughing at Downstream slope where steep slope occurs; minor erosion in the form of gullies caused by trespassing and run off. None at upstream slope.

Rock Slope Protection - Riprap Failures No Rock Slope Protection failures upstream; few areas on upstream slope have been displaced

Unusual Movement or Cracking at or near Toes At seasonal location highway drainage brook has eroded the downstream toe 1 to 2 feet

Unusual Embankment or Downstream Seepage About 10 feet wide of spoil at toe there is zone of dampness which is probably due to run off from previous rainfall.

Piping or Boils None observed

Foundation Drainage Features None

Toe Drains None

Instrumentation System None

Miscellaneous The crest is covered with vegetation, shrubs, ground cover, saplings and large trees. At several locations at crest there are animal burrows, some fairly large. The downstream slope is covered with heavy vegetation, shrubs, ground cover, saplings and very large trees; the roots of these trees are on or above the slope surfaces; Some trees have been cut in the past; Some animal burrows, some fairly large at several locations on the downstream slope. The upstream slope is covered with heavy vegetation including large trees. Also ground vegetation is growing up through much of the riprap protection.

PERIODIC INSPECTION CHECK LIST

PROJECT ASHFIELD POND DAM DATE 8-3-78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - CONTROL TOWER Control for low level outlet is in a gate shaft located near east training wall at spillway sill.

a. ~~Concrete~~ Stone Masonry and Structural

General Condition Visible portion of the gate shaft is in good condition; however, bottom of the gate shaft is completely filled with silt and debris to a level above the gate.

Condition of Joints Generally Good

Spalling None

Visible Reinforcing None

Rusting or Staining ~~of Concrete~~ None

Any Seepage or Efflorescence Although the gate is closed, dampness was observed at outlet.

Joint Alignment Generally Good

Unusual Seepage or Leaks in Gate Chamber See comment above

Cracks None observed

Rusting or Corrosion of Steel The operating mechanism is rusty.

b. Mechanical and Electrical Control is manually operated

Air Vents None

Float Wells None

Crane Hoist None

Elevator None

Hydraulic System _____

_____

Service Gates _____

_____

Emergency Gates _____

_____

Lightning Protection System _____

_____

Emergency Power System _____

_____

Wiring and Lighting System _____

_____

Miscellaneous. The operating mechanism for low level are open to public, however the top of gate shaft is protected by 1/2 inch steel reinforced mesh secured to the mechanism by means of wire.

PERIODIC INSPECTION CHECK LIST

PROJECT _____ DATE _____

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - TRANSITION AND CONDUIT Stone masonry conduit 53 inches wide and 40 inches high

General Condition of ~~Concrete~~ Masonry: Condition could not be determined because of inaccessibility.

Rust or Staining of Concrete —

Spalling —

Erosion or Cavitation See comment above

Cracking See comment above

Alignment of Monoliths See comment above

Alignment of Joints See comment above

Numbering of Monoliths —

PERIODIC INSPECTION CHECK LIST

PROJECT _____ DATE _____

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL

There is no outlet structure. and there is only spillway channel see comment on spillway & channel.

General Condition of Concrete _____

_____

Rust or Staining _____

_____

Spalling _____

_____

Erosion or Cavitation _____

_____

Visible Reinforcing _____

_____

Any Seepage or Efflorescence _____

_____

Condition at Joints _____

_____

Drain Holes _____

_____

Channel _____

Loose Rock or Trees Overhanging Channel _____

_____

Condition of Discharge Channel _____

_____

PERIODIC INSPECTION CHECK LIST

PROJECT *ASHFIELD POND DAM* DATE *8-3-78*

PROJECT FEATURE ______ NAME ______

DISCIPLINE ______ NAME ______

<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>

a. Approach Channel

General Condition ______

Loose Rock Overhanging Channel ______

Trees Overhanging Channel ______

Floor of Approach Channel ______

b. Weir and Training Walls

General Condition of *masonry and* Concrete *Weir and training walls are in generally in good condition [illegible] see misc. comments*

Rust or Staining *Concrete portion [illegible] training walls show no rust or staining.*

Spalling *None observed on concrete portion of training walls*

Any Visible Reinforcing *None*

Any Seepage or Efflorescence *At [illegible] spillway there are minor [illegible] leakage at the contact with first ~~step of spillway and the east training wall.~~ [illegible]* [redacted] *Also minor seepage from behind [illegible] downstream end of east training wall*

Drain Holes — none

c. Discharge Channel *Primary and [illegible] channels*

General Condition *Primary [illegible] Secondary channel is [illegible] swamp-like vegetation*

Loose Rock Overhanging Channel *In secondary [illegible] lined sides appears to have fallen [illegible]*

Trees Overhanging Channel *[illegible] channel has [illegible] overhanging trees*

Floor of Channel within limits of downstream training walls floor is of concrete and two channels is on natural bed. The secondary channel is partially blocked by stone masonry fallen from the walls

Other Obstructions As noted above and minor debris

Miscellaneous (1) There are few cavities caused by missing stone. The mortar in joints is almost entirely missing and there is some vegetation growing from joints.

(2) The concrete cap on spillway wall is in good condition.

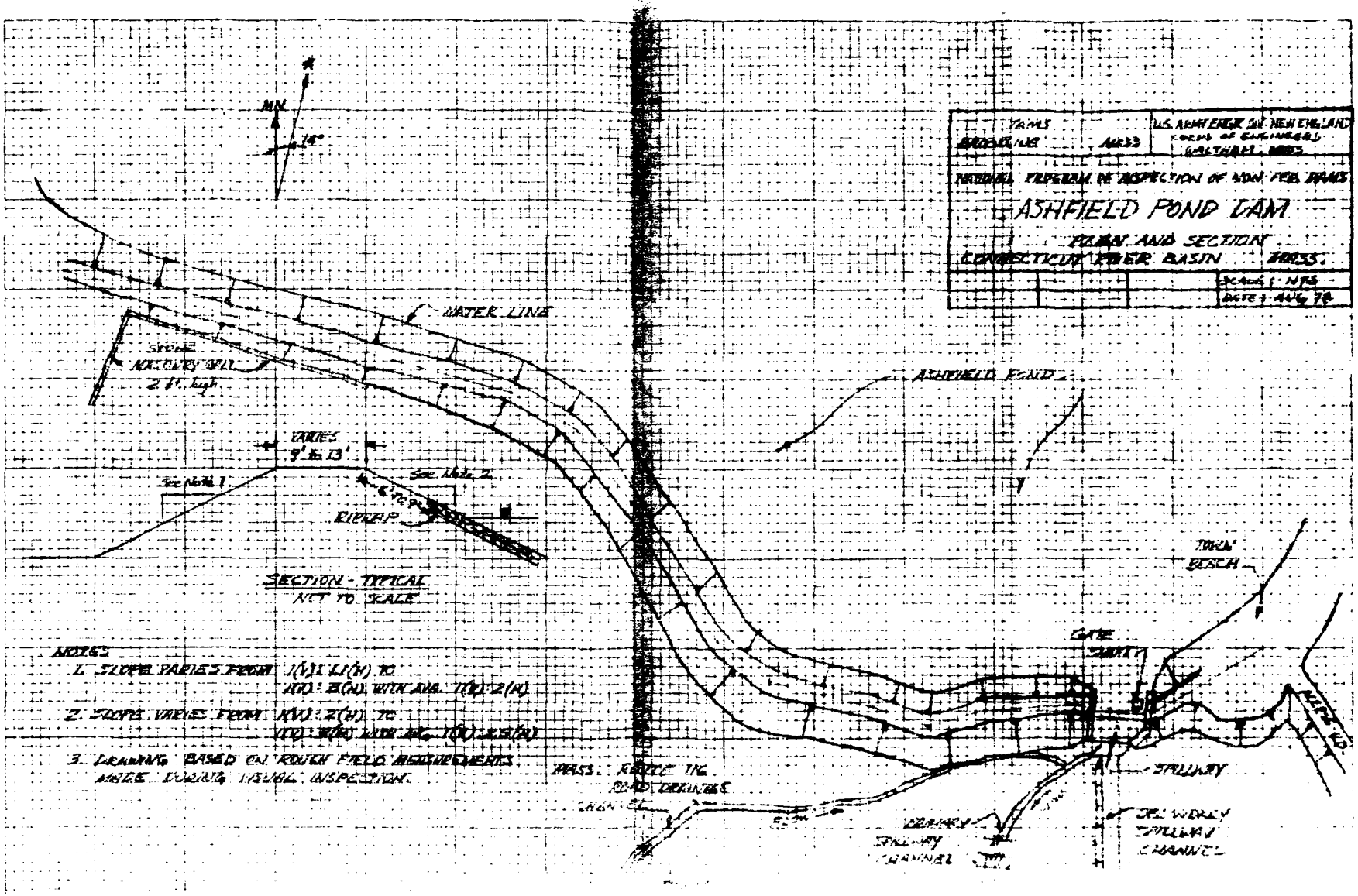
(3) The crest of spillway is sedimentated with beach sand and there is minor vegetation

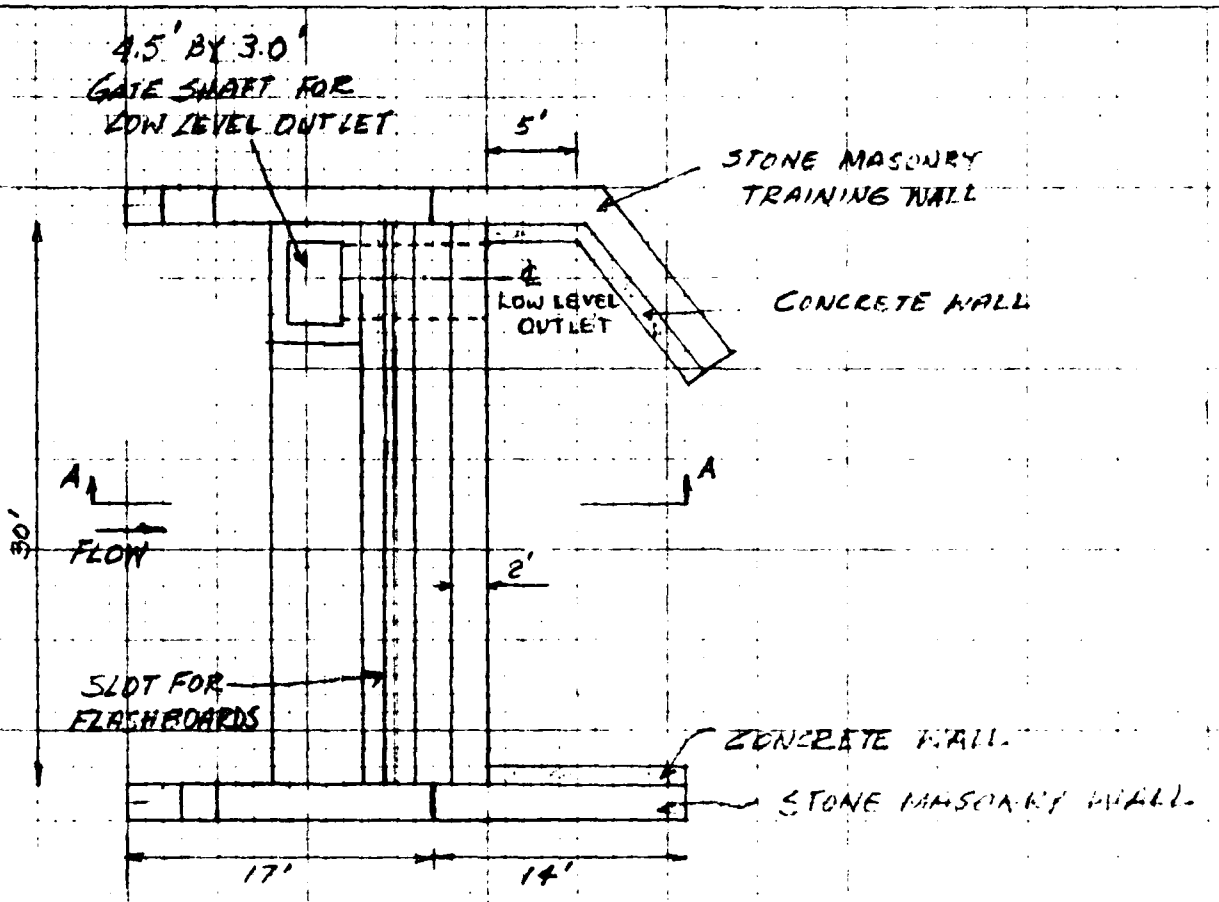
(4) At time of [illegible]

flash boards at crest of wall

DRAWINGS AND INSPECTION REPORTS

APPENDIX B


MN.
14°
WATER LINE
STONE MASONRY WALL 2 FT. high
VARIES 9' to 13'
See Note 1
See Note 2
6" to 9"
RIPRAP
SECTION - TYPICAL
NOT TO SCALE
NOTES
1. SLOPES VARIES FROM 1(V):1(H) TO 1(V):2(H) WITH AVG. 1(V):2(H)
2. SLOPES VARIES FROM 1(V):2(H) TO 1(V):3(H) WITH AVG. 1(V):2.5(H)
3. LEARNING BASED ON ROUGH FIELD MEASUREMENTS AND DURING VISUAL INSPECTION.
MASS. ROUTE 116
ROAD DRAINAGE DITCH
DRAINAGE SPILLWAY CHANNEL
SPILLWAY
SPILLWAY CHANNEL
ASHFIELD ROAD
TOWN BEACH
GATE SHAFT
ASHFIELD LAKE
TRANS BREAKLINE AUG 33
U.S. ARMY ENGR DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
ASHFIELD POND DAM
PLAN AND SECTION
CONNECTICUT RIVER BASIN MASS.
SCALE: NTS
DATE: AUG 78



PLAN

TAMS		U.S. ARMY ENGR. DIV. NEW ENGLAND
BROOKLINE	MASS.	CORPS OF ENGINEERS WALTHAM MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

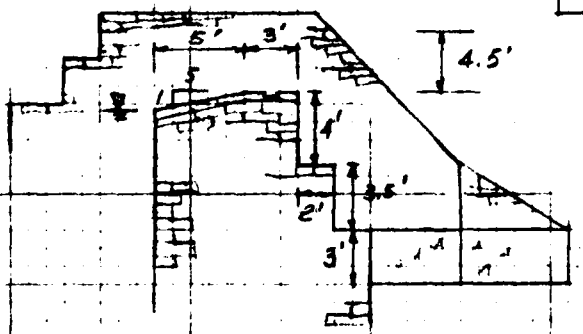
ASHFIELD POND DAM

SPILLWAY PLAN AND SECTION

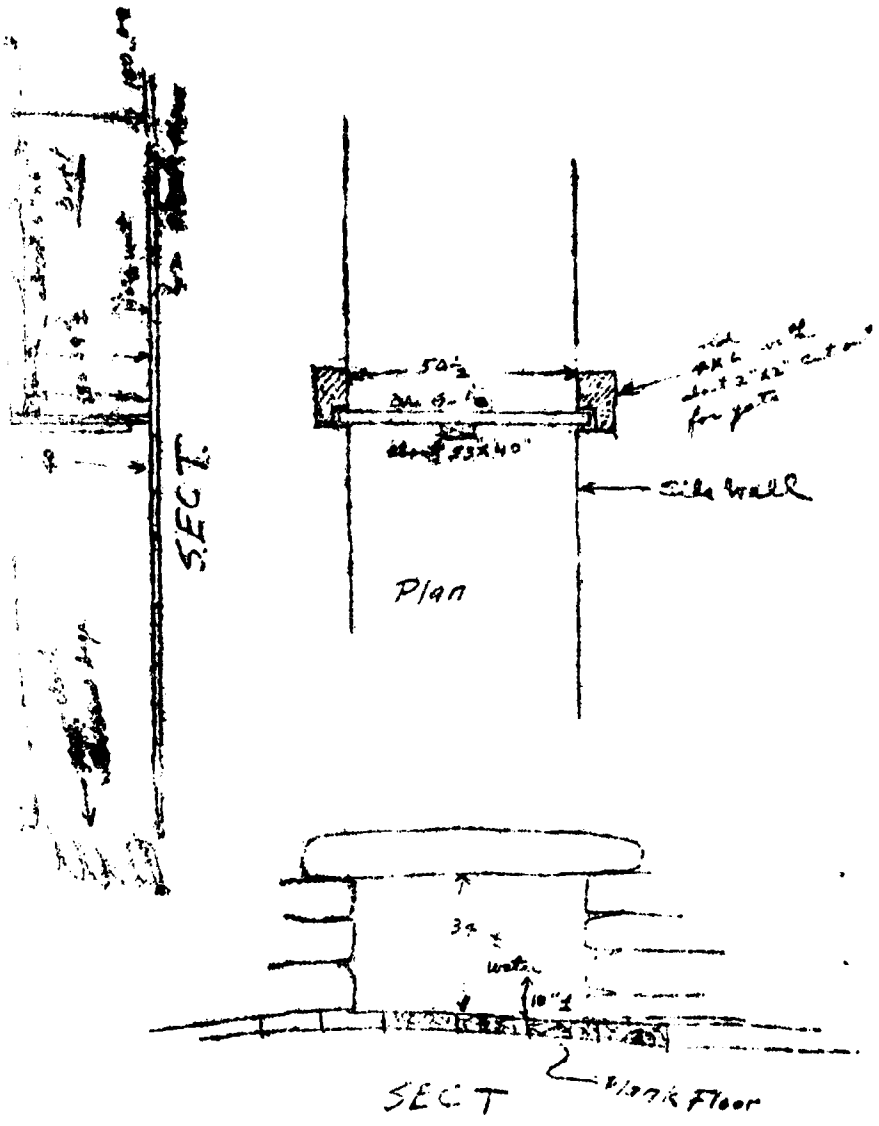
CONNECTICUT RIVER BASIN MASS.

SCALE: NTS

DATE: AUG 78



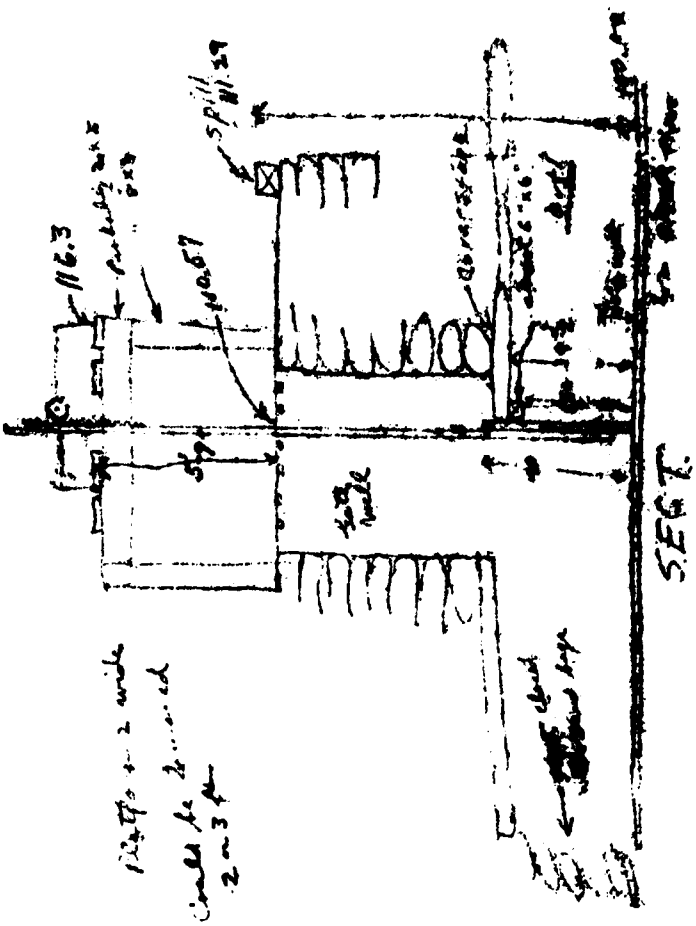
SECTION A-A



Ashfield Pond
8/27/36

SECTIONS
OUTLET

With .926



PLAN AND SECTIONS
LOW LEVEL OUTLET

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

October 25, 1976

Town of Ashfield
c/o Chairman, Board of Selectmen
Town Hall
Ashfield, Massachusetts

RE: Inspection Dam #2-6-13-1
Ashfield Pond Dam
Ashfield

Gentlemen:

On September 30, 1976 , an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be the Town of Ashfield. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams-Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however the following conditions were noted that require attention:

Attached is a copy of the District Dams Engineer's remarks and recommendations. Please note that he has rated this dam as conditionally safe.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

JOHN S. HANNON, P.E.
CHIEF ENGINEER

MAY 17 1978

A.MC:nlb
cc:Ashfield Park Commissioner

Enclosure

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Ashfield. County Franklin. Dam No. 2-6-13-1.

Name of Dam Ashfield Pond Dam.

Topo Sheet No. 7 D. Coordinates: Mass. Rect. N 559,000, E 249,900.

Inspected by: Harold T. Shumway, On Sept. 30, 1976. Date Last Inspection 10-30-74.

2. OWNER/S: As of Sept. 30, 1976

per: Assessors____, Reg. of Deeds____, Prev. Insp. X, Per. Contact X.

1. Town of Ashfield
% Chairman, Board of Selectmen, Town Hall, Ashfield, Mass.
Name | St. & No. | City/Town | State | Tel. No.

2. Name | St. & No. | City/Town | State | Tel. No.

3. Name | St. & No. | City/Town | State | Tel. No.

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Mr. Walter Tirrell,
Chairman, Ashfield Park Commission, Town Hall, Ashfield, Mass.
Name | St. & No. | City/Town | State | Tel. No.

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where At the Town Hall offices in Ashfield.

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor____. 3. Severe X.

2. Moderate____. 4. Disastrous____.

Comments: Approx. 107 million gallons impounded-Ashfield Village immediately downstream.

*This rating may change as land use changes (future development).

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Near eastend of dam-concrete capped crest overflow spillway 30'W.X4½' high with grouted stone masonry stepped dropwall-total drop 11'.

Controls Yes, TYPE: Provisions for stoplogs-none in place

Automatic ____. Manual X. Operative Yes ____, No X.

Comments: Vertical portions of dropwall has cavities from misplaced stones, bottom step has cavity 1'± X 3'± from displaced masonry.

No. 2 Location and Type: East end of spillway dropwall-2'H. X 4'W. stone and concrete masonry sluice.

Controls Yes, Type: Wood slide gate with metal stem-Rack and pinion lift.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: Seepage in upstream wall of gate well-leaks through gate seals.

No. 3 Location and Type: ____

Controls ____, Type: ____

Automatic ____. Manual ____. Operative Yes ____ NB ____

Comments: ____

Drawdown present Yes X, No ____. Operative Yes X, No ____.
Comments: See No. 2 above.

(7.) DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 4'±

Material: Turf X. Brush & Trees X. Rock Fill ____. Masonry (Stone Spillway) X. Wood ____

Other ____

Condition: 1. Good ____. 3. Major Repairs ____.
2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Low areas worn into top of embankment from pedestrian traffic. Large tree growth and minor brush growth on slope and top of dam.

(8.) DAM DOWNSTREAM FACE: Slope 1:1.

Material: Turf X. Brush & Trees X. Rock Fill ____. Masonry (Stone Spillway) X. Wood ____

Other ____

Condition: 1. Good ____. 3. Major Repairs X.
2. Minor Repairs ____. 4. Urgent Repairs ____.

Comments: Cavities in face of dropwall from misplaced stones, seepage, leakage flow out of drawdown sluice, and an eroded gully on embankment slope westerly of spillway.

(9.) EMERGENCY SPILLWAY: Available No. Needed No.

Height Above Normal Water_____Ft.

Width_____Ft. Height_____Ft. Material_____.

Condition: 1. Good_____. 3. Major Repairs_____.

2. Minor Repairs_____. 4. Urgent Repairs_____.

Comments: If high water should ever overflow dike at low spots, erosion of embankments could be rapid.

(10.) WATER LEVEL AT TIME OF INSPECTION: 6'± Ft. Above_____. Below X.

Top Dam X F.L. Principal Spillway_____.

Other_____.

Normal Freeboard 4½ Ft.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes-Brush and tree growth on both slopes.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam Pedestrian path along top of embankment and an erosion gully on downstream slope 100'± west of spillway.

Cracked or Damaged Masonry Yes-missing stones in face of dropwall.

Evidence of Seepage Yes-visible seepage near and at base of dropwall also in gate well.

Evidence of Piping None found.

Leaks Yes-through gate seals of drawdown sluice.

Erosion See damage to slopes above.

Trash and/or Debris Impeding Flow Minor trash deposits at spillway crest.

Clogged or Blocked Spillway None.

Other_____.

(12.) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed_____
3. Conditionally safe - major repairs needed X
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)

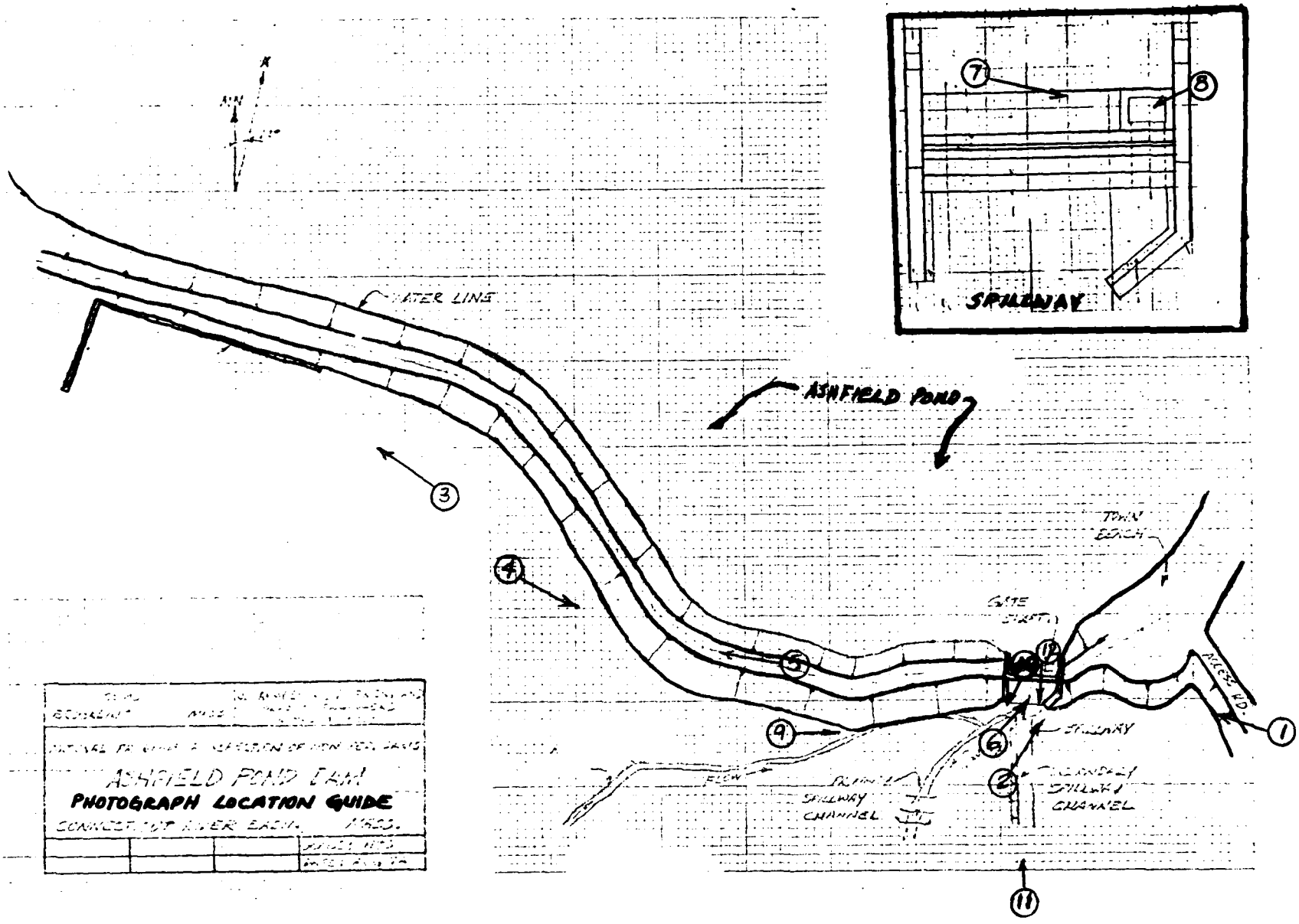
Some repairs have been made on this dam since last inspection of 10-30-74. A grating has been installed over the gate well opening and secured. Several areas of pointing up of the stone masonry walls of the spillway abutments was noted.

It appeared at this inspection that there were more cavities in the downstream face of the dropwall than noted in past inspections. However, these cavities, caused by misplaced stone masonry, were dry, with evidence of seepage noted only at the base of the dam. The seepage, leaks, tree and brush growth, and erosion problems all seemed to be the same as found at last inspection of 10-30-74. The District therefor still rates this dam as conditionally safe-major repairs needed.

JTS/at

PHOTOGRAPHS

APPENDIX C



ASHFIELD POND DAM

PHOTOGRAPH LOCATION GUIDE

CONNECTICUT RIVER BASIN, MASS.

2. VIEW OF SPILLWAY AND DOWNSTREAM SLOPE IN VICINITY OF EAST ABUTMENT.

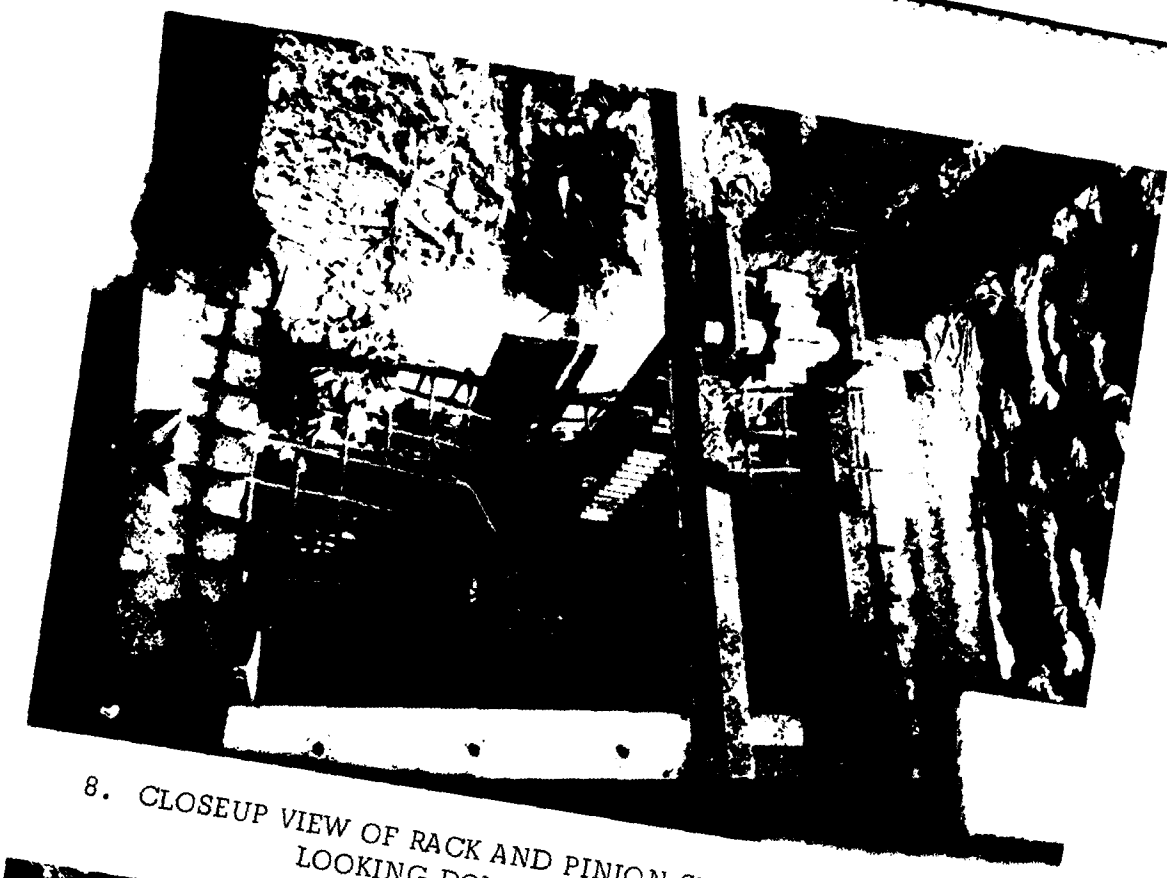
3. VIEW OF DOWNSTREAM SLOPE IN VICINITY OF WEST ABUTMENT. NOTE TREES ON SLOPES AND CLOSE PROXIMITY TO DAM OF RESIDENCE.

4. VIEW OF DOWNSTREAM SLOPE LOOKING EAST.
NOTE EXTREMELY HEAVY VEGETATION.

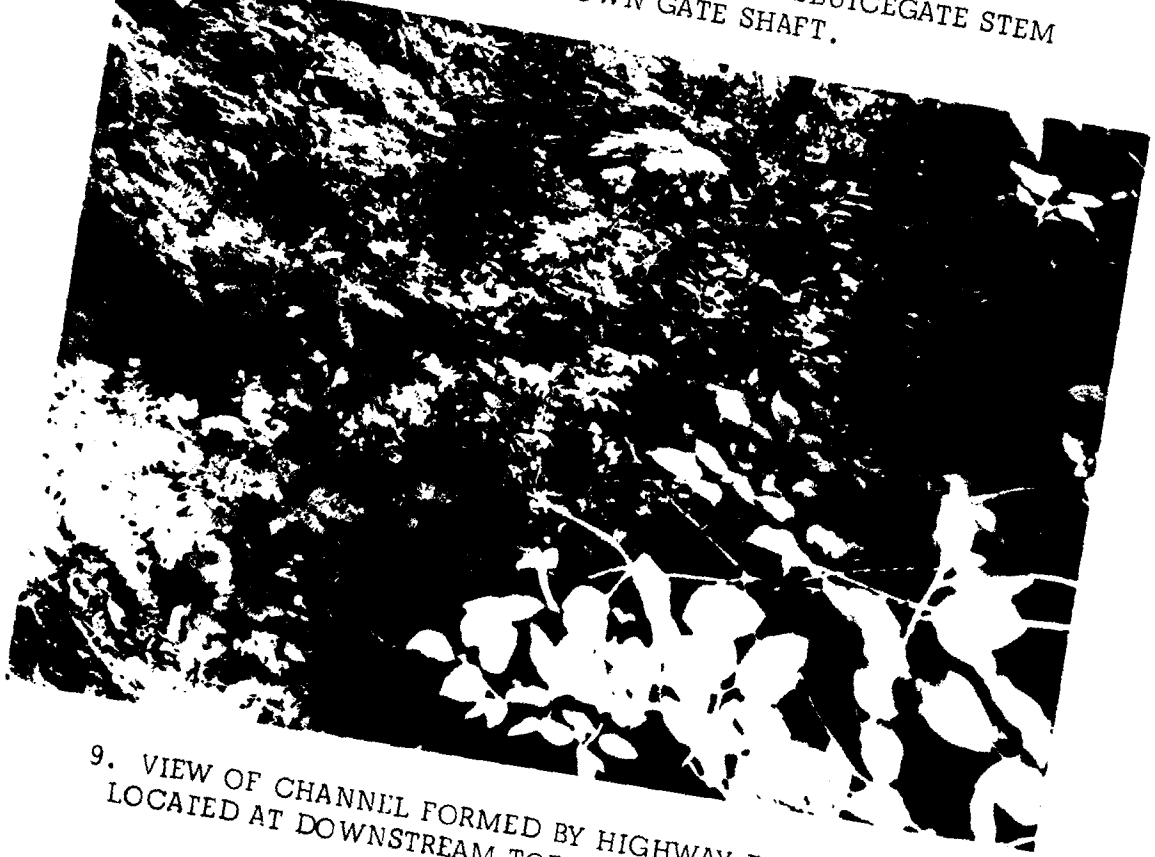
5. VIEW OF CREST LOOKING WEST.
NOTE PATHWAY AND HEAVY VEGETATION.

6. CLOSEUP VIEW OF SPILLWAY, LOW LEVEL OUTLET AND OPERATING STAND FOR SLUICEGATE. NOTE VEGETATION, CAVITIES AND DEBRIS.

7. CLOSEUP VIEW OF RACK AND PINION SLUICEGATE STEM AND SPILLWAY CREST. NOTE VEGETATION AND SILTATION ON SPILLWAY CREST.



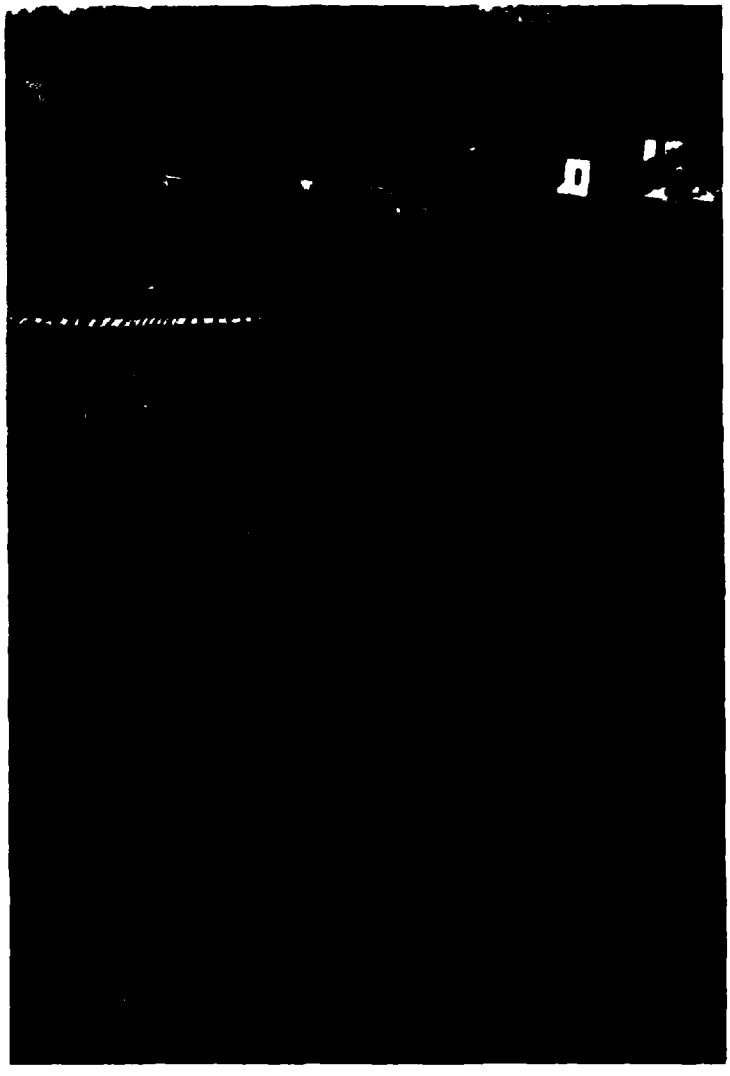
8. CLOSEUP VIEW OF RACK AND PINION SLUICEGATE STEM LOOKING DOWN GATE SHAFT.



9. VIEW OF CHANNEL FORMED BY HIGHWAY DRAINAGE LOCATED AT DOWNSTREAM TOE. NOTE VEGETATION.

10. VIEW OF PRIMARY CHANNEL LOOKING DOWNSTREAM. NOTE VEGETATION.

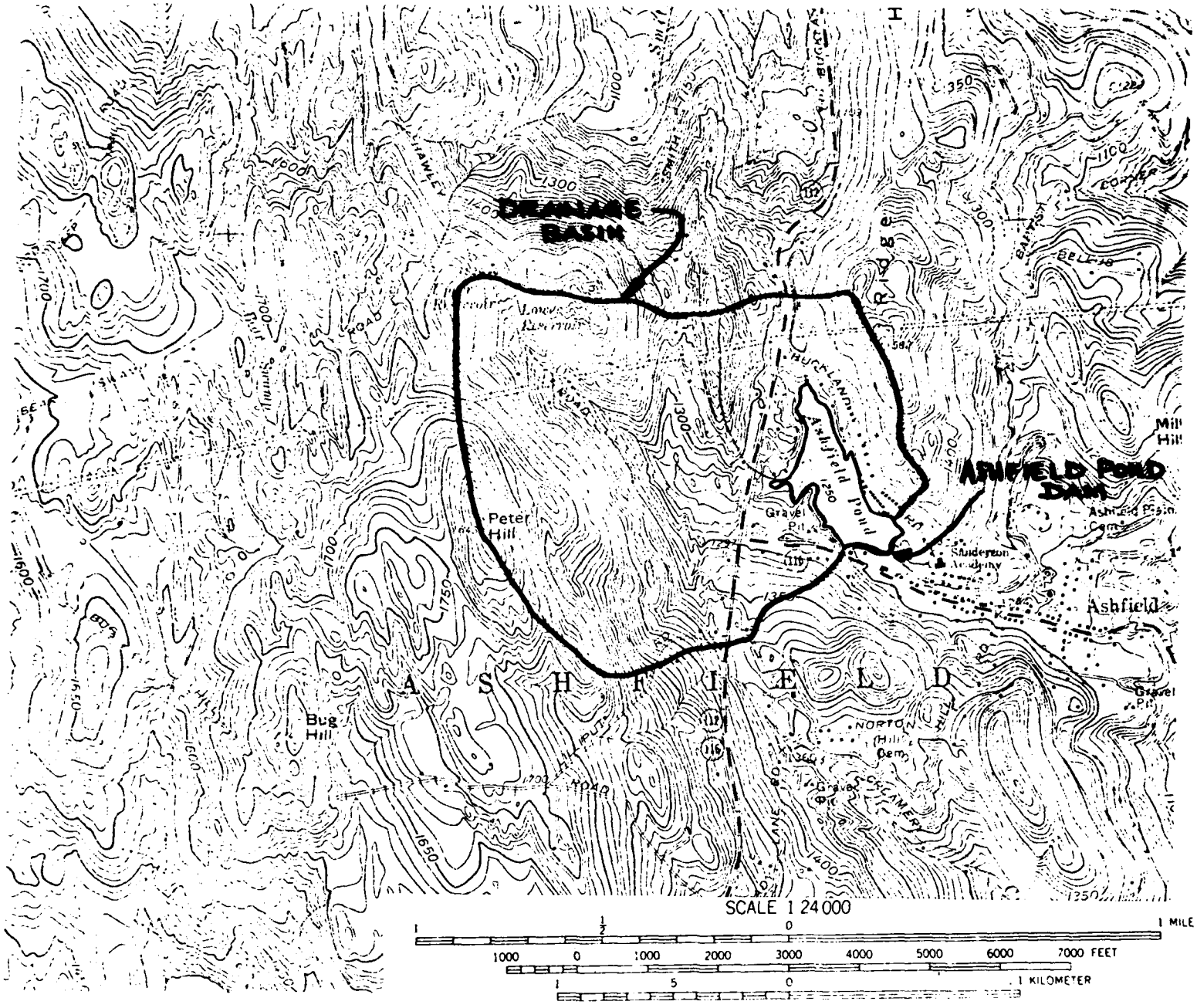
11. VIEW OF SECONDARY CHANNEL LOOKING TOWARD SPILLWAY FROM BUCKLAND ROAD BRIDGE. NOTE STONED LINED SIDES AND VEGETATION.



12. VIEW OF SECONDARY CHANNEL LOOKING DOWNSTREAM. NOTE VEGETATION IN CHANNEL.

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D


DRAINAGE BASIN
ASHFIELD POND DAM
Peter Hill
Bug Hill
Ashfield Pond
Gravel Pit
Ashfield
A S H F I E L D
SCALE 1 24000
1 MILE
7000 FEET
1 KILOMETER
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

TAMS

Job No. 1497-06 Sheet 1 of 10

Project DAM INSPECTION Date 7/26/78

Subject ASHFIELD POND (3 Sub-basins) By M. GONZALEZ

Ch'k. by

△ ELEVATION	BASIN LENGTH	DRAINAGE AREA
370'	6000 feet (1.14 miles)	0.73 sq miles

TIME OF CONCENTRATION

T_C = 0.310 HOURS (18.6 min.)

LAG = $0.6 T_C$ = 0.2 HOURS (11.4 MIN.)

D = $.2 T_C$ = 0.062 HOURS

T_P = D/2 + LAG

= 0.031 + 0.2

= 0.231 = 0.23 HOURS (15)

T_b = $2.67 T_P$ = 0.61 HOURS

$Q_P = \frac{484(0.73)}{0.23} = 1536.2$ C.F.S.

TAMS

Job No. A97-06 Sheet 2 of 10

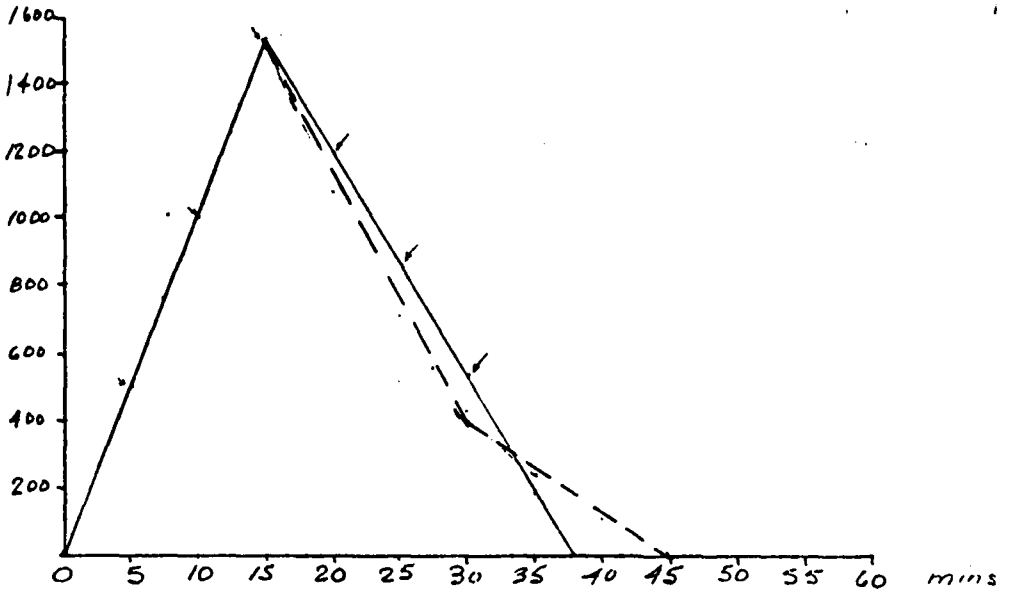
Project INSPECTION ASHFIELD POND DAM Date 8-2-78

Subject Unit Hydrograph Computation. (3 sub-basins) By D.L.C

Ch'k. by

Area = 468

$$\frac{(\Sigma Q) \times (\text{interval}) \times 60}{43560 \times [\text{area (acres)}]} \times 12 \equiv 1$$



$$RO = \left(\frac{1936 \times 15 \times 60}{43560 \times 468\ 2}\right)(12) = 1.0"$$

TAMS

Job No. 1497-06 Sheet 3 of 10
Project Inspection Ashfield Pond. Date
Subject Computation of Surcharge Storage. By
Ch'k. by

Elev	Area	Area	Δ Vol.	Surcharge Vol.
1250	37.8			0
		38.7	38.7	
1251	39.			38.7
		39.8	39.8	
1252	40.6			78.5
		41.2	41.2	
1253	41.8			119.7
		42.4	42.4	
1254	43.0			162.1
		43.6	43.6	
1255	44.2			205.7

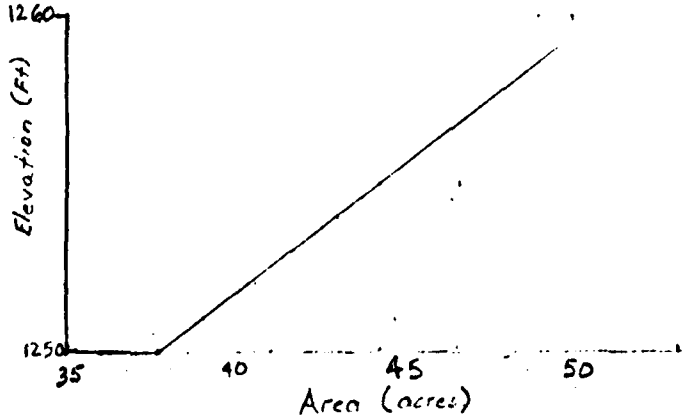


Table 1.

TAMS

Job No. 1497-
Project DAM INSPECTION
Subject ASHFIELD POND DAM.

Sheet 4 of 10
Date JULY 28,
By D.L.C.
Ch'k. by

Time (mins)	Excess Rainfall (inches)
0	0
	0.353
30	0.353
	0.371
60	0.406
	0.797
90	0.921
	0.921
120	1.046
	1.205
150	1.650
	2.235
180	1.401
	0.833
210	0.708
	0.637
240	0.548
	0.478
270	0.424
	0.424
300	0.388
	0.317
330	0.300
	0.299
360	0.265

Table 2

TAMS

Job No. 1497-06 Sheet 5 of 10

Project Inspection Ashfield Pond Date Aug 3. 1978

Subject Computation of PMF hydrograph + ½ PMF By J.L.C

Ch'k. by

Time	Discharge (CFS) ①	②	③	PMF ①+②+③	½ PMF
0	0		0		0
15	55.2	0	542.2	597.4	299
30	55.2	192 5	683.4	931.1	466.
	57.9	192 5	711.1	961.5	481
60	63.1	201.8	722.0	986.9	493
	120.9	219.8	1386.6	1727.3	864
90	139.3	421.6	1733.4	2294.3	1147
	139.3	485.6	1783.1	2408.0	1204
120	157.8	485.6	1975.1	2618.5	1309
	181.3	550.1	2269.3	3000.7	1500
150	247.2	632.1	3016.4	3895.7	1948
	333.7	861.7	4093.	5288 4	2644
180	210.3	1163.6	3046.	4419.9	2210
	126.2	733.2	1839.9	2699.3	1350
210	107.7	440.2	1420.7	1968.6	984
	97.2	375.6	1261.6	1734.4	867
240	84.1	339.0	1096.5	1519.6	760
	73.7	293.1	953.4	1320.2	660
270	65.7	257.0	842.5	1165.2	583
	65.7	229.1	820.9	1115.7	558
300	60.4	229.1	765.6	1055.1	528
	49.9	210.5	642.1	902.5	451
330	47.4	173.9	587.6	808.9	404
	47.2	165.1	579.3	791.6	396
360	42.2	164.6	526.6	733.4	367
		147.1	106.		

INFLOW Hydrographs due to rain on (1) lake surface
(2) unchannelled basin
(3) Stream basin.

Table 3

TAMS

Job No. 1497-06 Sheet 6 of 10
Project INSPECTION - HSHFIELD POND DAM Date AUG 1, 78
Subject Computation spillway head-discharge By
rating. Ch'k. by

Spillway length, L = 30.0 feet. Crest width = feet
Assuming spillway will act as broad-crested weir

Head (feet)	Elevation (feet)	C	$Q = CLH^{3/2}$ (CFS)
0	1260.0		0
0.5	1250.5	3.13	33.2
1.0	1251	3.14	94.2
2.0	1252	3.14	266.4
3.0	1253	3.26	508.2
4.0	1254	3 37	808.8
4.5	1254.5	3.37	965.1
5 0	1255		1130.3

Table 4.

Curves from King's Handbook [illegible] 5-16 4/5

TAMS

Job No. 1497-06 Sheet 7 of 10
Project INSPECTION - ASHFIELD POND DAM Date JULY 78.
Subject CAPACITY LOW LEVEL OUTLET COMPUTATIONS. By D.L.C.
Ch'k. by

USING $Q = Ca\sqrt{2gh}$

$$C = \left(1 + 0.4r^{0.3} + \frac{0.0045L}{r^{1.25}}\right)^{-\frac{1}{2}}$$

$$= (1 + 0.83 + 0.0082)^{-1/2} = \frac{1}{(1.84)^{1/2}} \; 0.74$$

$L = 38.0'$

$r = 11.4'$

$a = 6.8\ ft^2$

h.	$\sqrt{2gh}$	Ca	Q	Elevation
8.8	23.8	5.01	119.	1250.0
9.3	24.5		123	1250.5
9.8	25.1		126	1251.0
10.8	26.4		132	1252.0
11.8	27.6		138	1253.0
12.8	28.7		144	1254.0
13.3	29.3		147	1254.5
13.8	29.8	5.01	149	1255.0

Table 5.

INSPECTION - ASHFIELD POND DAM
AUGUST 8,1978

INPUT PARAMETERS

STARTING ELEV (FT.)	TIME INTERVAL (HOURS)	STARTING TIME (HOURS)	ENDING TIME (HOURS)	PRINT INTERVAL	GATE OPTION	PLOT OPTION	STORAGE COEF.	OUTFLOW COEF.	INFLOW COEF.	TIME COEF.	BREAK TIME
1250.00	0.12	0.00	10.50	1	NO	YES	1.000	1.000	1.000	1.000	0.000

RESERVOIR ELEV. (FT.)	RESERVOIR STORAGE (ACFT)	RESERVOIR OUTFLOW (CFS)
1250.00	0.0000	119.00
1250.50	19.0000	156.20
1251.00	38.7000	220.20
1252.00	78.5000	398.40
1253.00	119.7000	646.20
1254.00	162.1000	952.80
1254.50	184.0000	1112.10
1255.00	205.7000	1962.00

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
0.00	0.00		0.0000	1250.00
0.13	149.50	118.11	-0.4525	1249.98
0.25	299.00	120.23	0.6328	1250.01
0.38	382.50	124.65	2.8880	1250.07
0.50	466.00	130.65	5.9519	1250.15
0.63	473.50	137.44	9.4197	1250.24
0.75	481.00	144.24	12.8949	1250.33
0.88	487.00	151.04	16.3695	1250.43
1.00	493.00	158.90	19.8340	1250.52
1.13	678.50	172.99	24.1703	1250.63
1.25	864.00	192.74	30.2481	1250.78
1.38	1005.50	217.23	37.7862	1250.97
1.50	1147.00	254.97	46.4678	1251.19
1.63	1175.50	295.94	55.6168	1251.42
1.75	1204.00	336.34	64.6401	1251.65
1.88	1256.50	376.74	73.6643	1251.87
2.00	1309.00	424.25	82.7993	1252.10
2.13	1404.50	480.43	92.1392	1252.33
2.25	1500.00	538.97	101.8731	1252.56
2.38	1724.00	603.62	112.6207	1252.82
2.50	1948.00	684.18	124.9534	1253.12
2.63	2296.00	787.68	139.2655	1253.46
2.75	2644.00	908.77	156.0116	1253.85
2.88	2427.00	1026.28	172.2029	1254.23
3.00	2210.00	1151.43	185.0042	1254.52
3.13	1780.00	1432.06	192.1695	1254.68
3.25	1350.00	1476.29	193.2986	1254.71
3.38	1167.00	1403.83	191.4487	1254.67
3.50	984.00	1294.60	188.6598	1254.60
3.63	925.50	1181.54	185.7731	1254.54
3.75	867.00	1107.09	183.3114	1254.48
3.88	813.50	1087.77	180.6558	1254.42
4.00	760.00	1065.98	177.6600	1254.35
4.13	710.00	1042.02	174.3660	1254.28
4.25	660.00	1016.17	170.8129	1254.19
4.38	621.50	989.00	167.0767	1254.11
4.50	583.00	961.00	163.2277	1254.02
4.63	570.50	933.29	159.4032	1253.93
4.75	558.00	906.73	155.7296	1253.84
4.88	543.00	881.09	152.1836	1253.76
5.00	528.00	856.21	148.7435	1253.68
5.13	489.50	831.20	145.2947	1253.60
5.25	451.00	805.22	141.6917	1253.51
5.38	427.50	778.88	138.0487	1253.43
5.50	404.00	752.74	134.4341	1253.34
5.63	400.00	727.49	130.9477	1253.26
5.75	396.00	703.78	127.6628	1253.18
5.88	381.50	681.10	124.5269	1253.11
6.00	367.00	659.01	121.4725	1253.04

TIME (HRS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACFT)	ELEVATION (FT.)
6.13	352.37	638.92	118.4904	1252.97
6.25	337.75	621.22	115.5470	1252.89
6.38	323.12	603.70	112.6344	1252.82
6.50	308.50	586.36	109.7509	1252.75
6.63	293.87	569.18	106.8945	1252.68
6.75	279.25	552.15	104.0637	1252.62
6.88	264.62	535.27	101.2570	1252.55
7.00	250.00	518.52	98.4729	1252.48
7.13	236.25	501.93	95.7144	1252.41
7.25	222.50	485.51	92.9844	1252.35
7.38	208.75	469.25	90.2811	1252.28
7.50	195.00	453.15	87.6029	1252.22
7.63	181.25	437.18	84.9484	1252.15
7.75	167.50	421.35	82.3160	1252.09
7.88	153.75	405.64	79.7045	1252.02
8.00	140.00	392.16	77.1078	1251.96
8.13	132.50	380.59	74.5242	1251.90
8.25	125.00	369.21	71.9817	1251.83
8.38	117.50	358.00	69.4785	1251.77
8.50	110.00	346.96	67.0126	1251.71
8.63	102.50	336.08	64.5825	1251.65
8.75	95.00	325.35	62.1865	1251.59
8.88	87.50	314.77	59.8231	1251.53
9.00	80.00	304.33	57.4908	1251.47
9.13	73.33	294.04	55.1924	1251.41
9.25	66.66	283.91	52.9307	1251.35
9.38	60.00	273.94	50.7038	1251.30
9.50	53.33	264.12	48.5103	1251.24
9.63	46.66	254.44	46.3486	1251.19
9.75	40.00	244.90	44.2174	1251.13
9.88	33.33	235.49	42.1152	1251.08
10.00	26.66	226.20	40.0407	1251.03
10.13	20.00	217.89	37.9911	1250.98
10.25	13.33	211.25	35.9468	1250.93
10.38	6.66	204.61	33.9022	1250.87
10.50	0.00	197.97	31.8574	1250.82
MAX. VALUES	2644.00	1476.29		1254.71
MIN. VALVES	0.00	118.11		1249.98

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
MA	523	NED	MA	011	01				ASHFIELD POND DAM	4231.7	7247.7	08SEP78

POPULAR NAME	NAME OF IMPOUNDMENT
	ASHFIELD POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	08	TR-CONNECTICUT	ASHFIELD	0	1500

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PHY/FED	SCS A	VER/DATE
REGNPG	1800	R	15	11	490	306	NED	N	N	N	N	31AUG78

REMARKS

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NO	NAVIGATION LOCKS LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	775	U	30	965												

OWNER	ENGINEERING BY	CONSTRUCTION BY
TOWN OF ASHFIELD		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
TIPPETTS-ABBETT-MCCARTHY-STRATTON	03AUG78	PL 92-367

REMARKS

END

FILMED

7-85

DTIC